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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,984	01/21/2004	G. Paul Koning	3721.1004-004 (EQLC-P01-0)	5998
21005 7590 09/10/2008 HAMILTON, BROOK, SMITH & REYNOLDS, P.C. 530 VIRGINIA ROAD P.O. BOX 9133 CONCORD, MA 01742-9133			EXAMINER DOAN, DUC T	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/762,984	Applicant(s) KONING ET AL.	
	Examiner DUC T. DOAN	Art Unit 2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 June 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10, 12, 14-21 and 23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 12, 14-21 and 23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

Claims 11,13, 22 and 24 have been canceled.

Claims 1-10,14-21 and 23 are pending in the application.

Claims 1-10,14-21 and 23 are rejected.

The applicant's remarks filed 6/6/2008 have been considered with the results that follow.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 6-10,12,14-21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blumenau et al (US 2004/0080558).

As in claim 1, Blumenau discloses an apparatus for resource migration Fig 4, comprising a storage system having a plurality of storage servers (Fig 4: #401A, #401B servers) with a set of resources partitioned thereon (Fig 4: set of data in volumes),

Blumenau discloses said storage servers having a load monitor process capable of communicating with other load monitor processes for generating a measure of loading on

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respective ones of the plurality of servers (Blumenau's paragraphs 31-32 discloses the servers' processes communicate with each other using information in the state table #105 to execute properly any storage processes such as backup, copy, recover etc.

Blumenau in another embodiment teaches that the state information is configured with information to allow a load balance operation, thus the state information must include a measure of loading for servers and storage elements involved, see Blumenau's paragraph 64) ; It would have been obvious to one of ordinary skill in the art at the time of invention to include the load balance's information in the configuration table as suggested by Blumenau in Blumenau's system and allowing servers to transferring data to available storage location in storage system and thereby further utilize the resources in an efficiently manner.

Blumenau further discloses a resource migration process for transferring a resource from one of said plurality of servers to another of said plurality of servers in response to said measure of loading (see Blumenau's paragraph 64, migrate data from the storage system #402A to another storage system because performance reason, processor bound approaching its performance limit etc..) ; and

Blumenau further disclose a write-detect process which:

(i) detects when a resource write request applies to a resource that is in the process of being moved from a first server to a second server, and which in response to such resource write request writes copies of the resource to both of said first and second server (Blumenau's paragraph 39, detecting the write requests to be applied to an area being migrated, in response to such write requests, write to both source and target volumes to insure consistency between the source and target volumes, see Blumenau's paragraph 40) and

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(ii) in response to a write failure on the second server, restarts the migration process for the resource to ensure that the write request is propagated to the second server (Blumenau's paragraphs 39-40 discloses writing to both source and target volumes to ensure the write requests are received by both source and target volume. Blumenau's paragraphs 42 in an embodiment further discloses in response to a write failure, for example at the target, the write is not completed, the migration process is restarted "the DBMS will reissue the request").

As in claim 2, Blumenau further discloses wherein said servers are equivalent to each other (Blumenau's Fig 4, server #401A is equivalent to server #401B).

As in claim 3, Blumenau further discloses wherein said resources are selected from the group consisting of data blocks, program files, multimedia files, applications, and database files (Blumenau's paragraph 35 resources comprises files in file system, data of data bases etc..).

As in claim 4, Blumenau further discloses wherein said measure of loading reflects both a storage system load and a server load (Blumenau's paragraph 64, measure of loading of a storage system comprises storage system approaching capacity, servers approaching its performance limits etc..).

As in claim 6, Blumenau further discloses wherein the load monitor includes a process to determine whether a server is servicing a disproportionate share of the client requests being handled by a server group (Blumenau's paragraph 64).

As in claim 7, Blumenau further discloses wherein the resource migration process includes a block data migration process (Blumenau's paragraphs 50-51, migration of block of data, a unit of storage, a location on the disk).

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As in claim 8, Blumenau further discloses a routing table for tracking resources maintained on the system (Blumenau's Fig 3: #301 state information table to track resources routing among source and target volumes).

As in claim 9, Blumenau further discloses wherein a pointer to a resource is maintained during an access operation to provide continuous data access (Blumenau's paragraph 50, state information #310 includes indicator points to location of resource to provide for continuous data access).

As in claim 10, Blumenau further discloses wherein the load monitoring process monitors one or more of network traffic load, I/O request load, storage traffic pattern type (Paragraph 64, monitoring I/O request load to servers).

As in claim 12, Blumenau further discloses wherein the resource migration process divides the resource being moved into smaller subresources , and wherein the write-detect process:

(i) detects when a resource write request applies to a subresource that is in the process of being moved from a first server to a second server, and in response to such resource write request writes copies of the subresource to both of said first and second server, and

(ii) wherein restarting the migration comprises restarting the migration for the subresource (Claim 12 is rejected based on the same reason as of claim 1. Blumenau's paragraph 50 further discloses the state information #301 can be easily configured to include state information for any data granularity (volume, data blocks, groups of data blocks, a track or any portion of data..)) .

As in claim14, Blumenau discloses a process for moving resources across a storage system having a plurality of storage servers (Fig 4: #401A, #401B servers) with a set of

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resources partitioned thereon (Fig 4: set of data in volumes), comprising the steps of monitoring a load on a server and communicating with other load monitor processes for generating a measure of loading on respective ones of the plurality of servers;

Blumenau further discloses transferring, as a function of the measured loads, a resource from one of said plurality of servers to another of said plurality of servers in response to said measure of loading (Blumenau in another embodiment, paragraph 64 teaches a load balance data transferring, as a function of the measured requests to servers, data from a storage #402A is migrated to another storage system); and

Blumenau further disclose a write-detect process which:
detects when a resource write request applies to a resource that is in the process of being moved from a first server to a second server, and which in response to such resource write request writes copies of the resource to both of said first and second server (Blumenau's paragraph 39, detecting the write requests to be applied to an area being migrated, in response to such write requests, write to both source and target volumes to insure consistency between the source and target volumes, see Blumenau's paragraph 40) and
in response to a write failure on the second server, restarts the migration process for the resource to ensure that the write request is propagated to the second server (Blumenau's paragraphs 39-40 discloses writing to both source and target volumes to ensure the write requests are received by both source and target volume. Blumenau's paragraphs 42 in an embodiment further discloses in response to a write failure, for example at the target, the write is not completed, the migration process is restarted "the DBMS will reissue the request").

Claim 15 is rejected based on the same reasons as of claim 2.

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Claim 16 is rejected based on the same reasons as of claim 4.

Claim 17 is rejected based on the same reasons as of claim 6.

Claim 18 is rejected based on the same reasons as of claim 7.

Claim 19 is rejected based on the same reasons as of claim 8.

Claim 20 is rejected based on the same reasons as of claim 10.

Claim 21 is rejected based on the same reasons as of claim 9.

Claim 23 is rejected based on the same reason as of claim 14. Blumenau's paragraph 50 further disclose the state information #301 can be easily configured to include state information for any data granularity (volume, data blocks, groups of data blocks, a track or any portion of data..).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Blumenau et al (US 2004/0080558) as applied to claim 1 and in view of Applicant's admitted prior art (APA).

As in claim 5, Blumenau does not expressly disclose the storage system is a Storage Area Network. However, APA's page 3 discloses storage devices are further configured as Storage Network Area. It would have been obvious to one of ordinary skill in the art at the time of invention to include the storage devices in SAN configuration as suggested by APA in Blumenau's system thereby further provide users of several networks can easily share data stored in a large high speed network storage system (APA's page 3).

Response to Arguments

Applicant's arguments in response to the last office action has been fully considered but they are not persuasive. Examiner respectfully traverses Applicant's arguments for the following reasons:

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Regarding Applicant's arguments for the rejections of claims 1-4, 6-10,12,14-21 and 23 under 103(a) the arguments are not persuasive,

A) Applicant argues that “..The claims are specifically directed to what happens when a write failure occurs on the target server (i.e., the "second server" as recited in the claims). This is handled in a simple and efficient way - by restarting the migration process for the resource which had the write request issued to it. In this way, the simultaneous write to the source server (i.e., the claimed first server) is leveraged. The effected resource is simply re-migrated, "ensuring that the write request is propagated to the second server," as claimed.

As has been noted in Applicants' previous correspondence, Blumenau does not disclose an approach for detecting target server write failures in a resource migration process, and in response thereto, restarting that same migration process in a partitioned resource storage system..”. Examiner disagrees.

In response, Blumenau's paragraph 39-40 clearly teaches that writing to both source and target volumes “..while one or more write operations to be applied to both the source and target volume..” during the migration of data from the source volume to the destination volume (see paragraph 40); During these writing operations, if an abnormal event such as interruption occurs, data transferring states of these write operations must be kept track to determine the failure and/or completion of these writing operations, “to recover from such interruption, generally, a process seeks to determine the state of the pending write operations when failure occurred”.

Blumenau's paragraph 42 further teaches that in case of writing operation failures, (i.e the write operations not completed), these operations must be retried by the software that

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initiates the request, "...and most applications will reissue the write request... if an operation is not completed within a certain amount of time, the DBMS will reissue the request".

Applicant further argues, "*We note first that Blumenau discloses a much more involved and complicated data recovery process that compares the source and target data with state information to determine which data is "good" and which is "bad" (see paragraph [0048], lines 2-5 and paragraph [0049], lines 2-7). For example, the state information may be a count which indicates the number of data operations performed on a particular storage location [0051]. Blumenau's recovery process then specifically copies the good data from the storage location where the write completed successfully to the other location, based on the state information. See paragraph [0048], lines 5-7 and [85], lines 9-12. The data in the location where the most recent write occurred is thus relied upon as being the "good" data, based on the state information. Alternatively, Blumenau's recovery process invalidates data stored at both locations. See paragraph [0048], lines 20-23 and paragraph [85], lines 9-11. Blumenau's process is thus entirely different from Applicants simplified approach of restarting the migration process for the resource in response to a write failure on the second ("target") server..*". Examiner disagrees.

In response, there is nothing complicate about keeping a status/keeping track whether write operations has been complete migrated to the destination or they fails to migrate to the destination. This basic status information is required to determine whether or not data is properly migrated/successfully migrated to the destination and thus the software can retry the failure operations.

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Therefore Applicant's argument is not persuasive. And Blumenau teaches the recited claim limitations.

Applicant further argues *"The Examiner points to Blumenau at paragraphs [0039 through 0040] as supposedly teaching this feature of Applicants' claimed invention, of writing to both source and target volumes in response to a write failure on a second server. The Examiner furthermore believes that Blumenau's paragraph [0042] discloses that when the write is not completed, a migration process is restarted, pointing to Blumenau's statement that the "DBMS will reissue their request". However, Blumenau's paragraph [0042] cannot be read out of context. In particular, in the immediate prior paragraph [0041] it is discussed that in view of the fact that the source volumes are maintained on line, there is a risk that the system might crash while one or more write operations are pending. It is then described that there are four possible states in which the write operation could possibly be when the system crashed. In the first part of paragraph [0042] it is explained that in a first state (state 1), the write operation has not been performed successfully on either the source volume or the target volume. This state is believed by Blumenau to "not be problematic" as the source (B 1) and target (B2) volumes are consistent, such that the migration is "not at risk of being performed inaccurately". Thus Blumenau says that in this state (and only in this state) it is entirely "within the control of the application program that issued the outstanding write request" to recover from the crash. This is because the application will not have received any acknowledgment that the write completed, and therefore the application can simply reissue the write request. In the case he describes, where a database management server (DBMS) has issued the write request, the DBMS itself will keep a queue of operations and their status. Thus, there is no need for the lower*

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level storage server to do so. If an operation is not completed within a certain amount of time, the DBMS will re-issue the request. This section of Blumenau is thus referring to the actions of a high level application (e.g., a DBMS) when an operation is not completed within a certain amount of time. More importantly, this function of Blumenau's system is happening in a context where the two volumes are in no danger of being inconsistent. This situation is thus different from the claimed element of a write-detect process that responds to a write failure on a second server - a specific situation where there is very much the danger of the two volumes being inconsistent".

In response, Examiner notes the DBMS merely illustrating the software that issues the request. **This software is a part of the server** to control the migration of data from source to destination. Applicant admits that Blumenau teaches when failure in a system occurs, for example, the destination device/server fails and cannot return the acknowledgment within a certain amount of time, the initiator/DBMS detects this failure and re-issues the request. This teaching reads on the claimed limitation, "in response to a write failure on the second server, restarts the migration process for the resource to ensure that the write request is propagated to the second server".

In addition, Applicant's argument regarding "this situation is thus different from the claimed element of a write-detect process that responds to a write failure on a second server - a specific situation where there is very much the danger of the two volumes being inconsistent..". First, Examiner notes that the feature "specific situation where there is very much danger of the two volumes being inconsistency.." is not claimed. In fact, the claim merely states "detects when a resource write request applied to a resource that is in the process of being move". Thus if a

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resource merely about to be moved from source to destination would met the claim language (i.e. the resource in the “low danger of being inconsistent”). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Therefore Applicant’s argument is not persuasive.

B) Applicant further argues “*With respect to other aspects of the Applicants' Claim 1, we note that Blumenau also does not actually disclose that server processes communicate with each other using information in a state table to generate a measure of loading on respective servers. All that Blumenau's state table 105 stores is information concerning back up, copy and recovery. These features do not include, suggest, or teach maintaining data indicative of load across a plurality of servers, or doing anything in response to the same.*”

In response, Examiner notes that the limitation “a state stable to generate a measure of loading on respective servers” is not claimed. ”). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Additionally, Blumenau teaches the limitation “a resource migration process for transferring a resource from one of said plurality of servers to another of said plurality of servers in response to said measure of loading” (see Blumenau’s paragraph 64, migrate data from the storage system #402A to another storage system because performance reason, processor bound approaching its performance limit etc..).

Therefore Applicant’s argument is not persuasive.

C) Applicant further argues “ *There are additional reasons why at least Applicants' Claim 6 should be allowed. The Examiner is of the opinion that Blumenau further discloses that a load monitor process determines whether a server is servicing a disproportionate share of client requests in a server group, referring to Blumenau's paragraph [0064]. There is a mention in that paragraph of monitoring when the storage system 402a becomes processor bound, approaching its performance limit, or storage capacity (e.g., storage system 402a may have one or more storage volumes that approach full capacity). **But this does not amount to a teaching, suggestion or even an inference that there is any determination of the number of client requests or share of client requests being handled by a specific server***”.

In response, Blumenau's paragraph 64 teaches that the migration of data from one server to another (i.e servers/processors 401-A 401-B) may be due to several reasons, for example to balance the load among these servers thus to improve the performance (i.e storage system 402A is processor bound or approaching its performance limit). Thus it can be seen the number of data requests per each processor/server (corresponding to the claim's number of client requests. It's noted that a server/computer receives data requests from a client/computer) must be maintained in order to determine the loading of these servers and further allowing migrating workload, redistributing workload among these servers and improve the overall performance.

Therefore Applicant's argument is not persuasive.

D) Applicant further argues “*We also believe that at least Claim 8 should be allowed. Blumenau admittedly does disclose a state information table that is used to track the state of a storage element in a logical volume 303. For example, in paragraph [0051] is explained that*

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state information 301 may include a count 302 which indicates a number of data operations performed on a corresponding storage element of volume 303. It is also stated in paragraph [0054] that state information 301 may include other information used for recovery, such as to track information as needed for disk mirror processes. However, there is no mention, suggestion, or teaching in Blumenau that this state table is used to perform any routing function, or maintain data that would permit routing based on state”.

In response, Blumenau’s paragraph 64 teaches a migration of data from a source volume to a destination volume, due to several reasons, for example when one or more volumes are approaching their capacity. In such cases, the state information is required to indicate where-about of the data, whether data should be retrieved from the source volume or from the destination volume. Therefore, the state data inherently contains the information to perform direct/ route the requests to the proper locations/volumes. In consistently manner, paragraphs 51 and 54 suggests information pertain to proper locations/volumes of the requests and corresponding data such as counts of requests per a specific location, track locations of corresponding data etc.. must be maintained to determine the where about and the status of the corresponding data.

Therefore Applicant’s argument is not persuasive.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 36 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

When responding to the office action, Applicant is advised to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist examiner to locate the appropriate paragraphs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Duc T. Doan whose telephone number is 571-272-4171. The examiner can normally be reached on M-F 8:00 AM 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung S. Sough can be reached on 571-272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Hyung S. Sough/
Supervisory Patent Examiner, Art Unit 2188
09/04/08